



NTP National Toxicology Program

NTP Workshop: Role of Environmental Chemicals in the Development of Diabetes and Obesity January 11-13, 2011

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New Jersey



NTP Workshop: Role of Environmental Chemicals in the Development of Diabetes and Obesity

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Raleigh Marriott Crabtree Valley • 4500 Marriott Drive

There has been increasing interest in the concept that environmental chemicals may be contributing factors to the epidemics of diabetes and obesity. The National Toxicology Program (NTP) is holding a workshop to evaluate the science associating exposure to certain chemicals or chemical classes with the development of diabetes and obesity in humans. Participants at the workshop will:

- Evaluate strength/weaknesses, consistency, and biological plausibility of findings reported in humans and experimental animals for certain environmental chemicals including arsenic and cadmium, PCBs, DDT/DDE, other organohalogenes, bisphenol A, phthalates, and organotin
- Identify the most useful and relevant endpoints in experimental animals and *in vitro* models
- Identify relevant pathways and biological targets for assays for the Toxicology Testing in the 21st Century high throughput screening initiative ("Tox21")
- Identify data gaps and areas for future evaluation/research

The format of the workshop includes both plenary talks and breakout groups. The workshop is open to the public with time set aside in the agenda for public comments during the plenary session on the first day. The public can attend the breakout groups as observers. A literature review document will be prepared prior to the meeting. Information about the workshop and on-line [registration](#) are available from the NTP website. Registration is on a first come basis and is limited to 100 people. For additional information, contact Dr. Kristina Thayer (thayer@niehs.nih.gov or 919-541-5021).

This workshop is sponsored by the National Institute of Environmental Health Sciences/NTP, U.S. Environmental Protection Agency, and the FDA National Center for Toxicological Research.





Interest

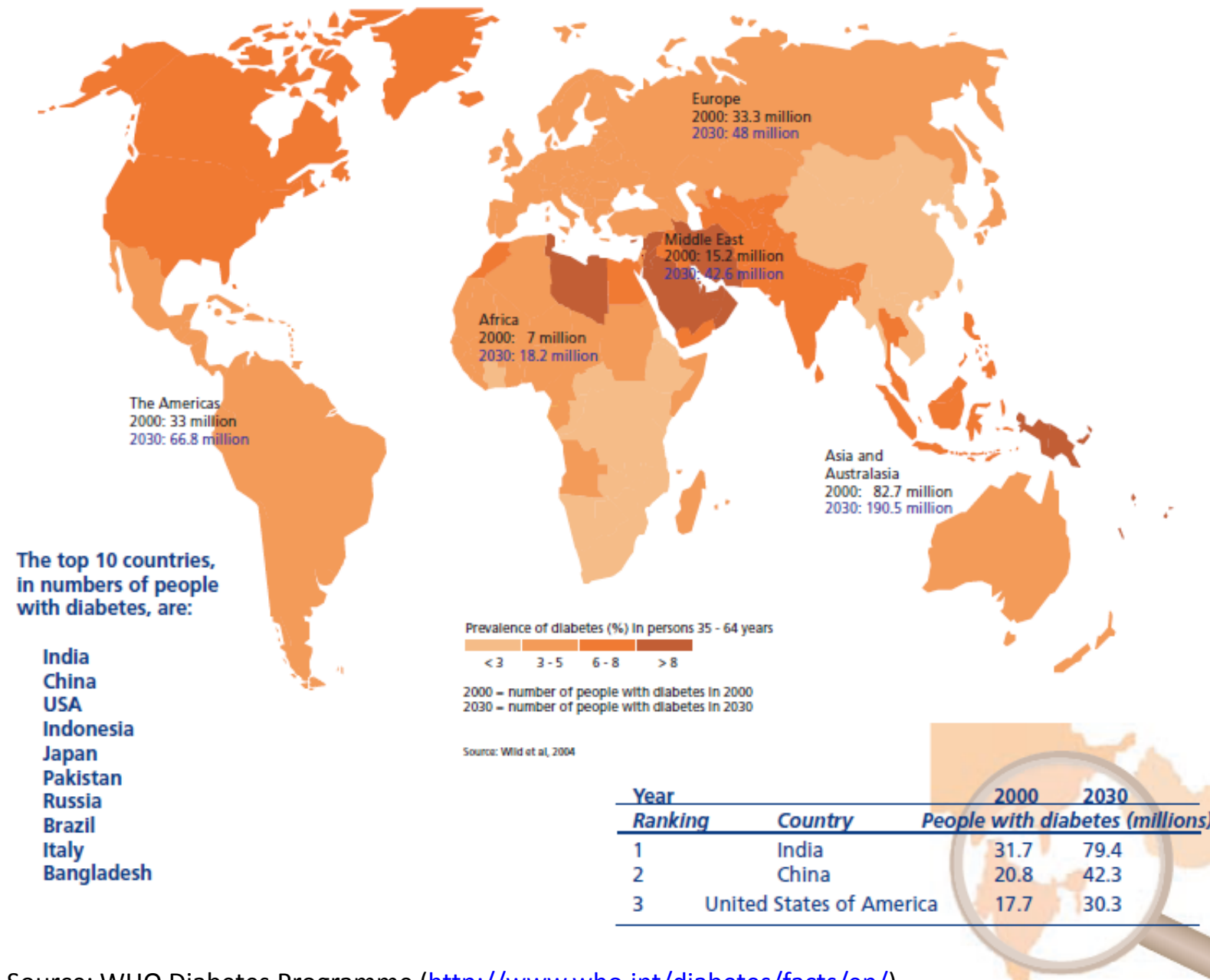
- President's Childhood Obesity Taskforce
- NIH Obesity Taskforce
- President's Children's Environmental Health Task Force
- International Obesity Taskforce



Diabetes & Obesity are Major Threats to Human Health

- **12.9% of people ≥ 20 of age in US estimated to have diabetes of which ~40% undiagnosed NHANES 2005-2006 (Cowie 2009)**
 - Based on fasting glucose and 2-hour glucose tolerance
 - ~40% with diabetes or pre-diabetes
 - 29.5% with pre-diabetes (impaired fasting glucose or impaired 2-hour glucose tolerance)
- ~70% of type 2 diabetes risk attributed to overweight/obesity (Eyre 2004)
 - i.e., ~30% not accounted for by body weight
- Increased age-adjusted prevalence of metabolic syndrome
 - 29.2% NHANES 1988-1994 to 34.2% NHANES 1999-2006 (Mozumdar 2011)

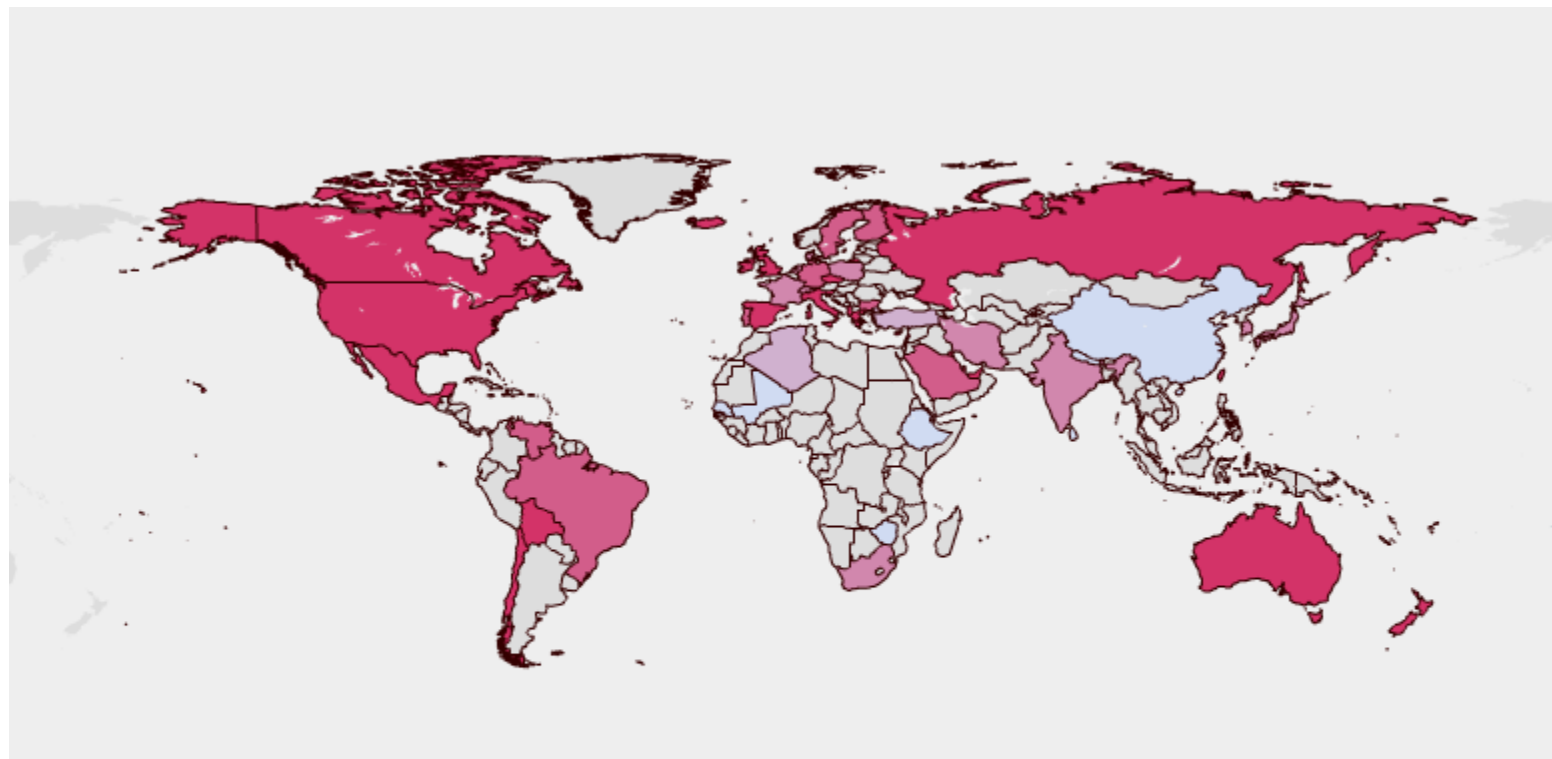
Prevalence of diabetes



Source: WHO Diabetes Programme (<http://www.who.int/diabetes/facts/en/>)



Percent of Children with Obesity



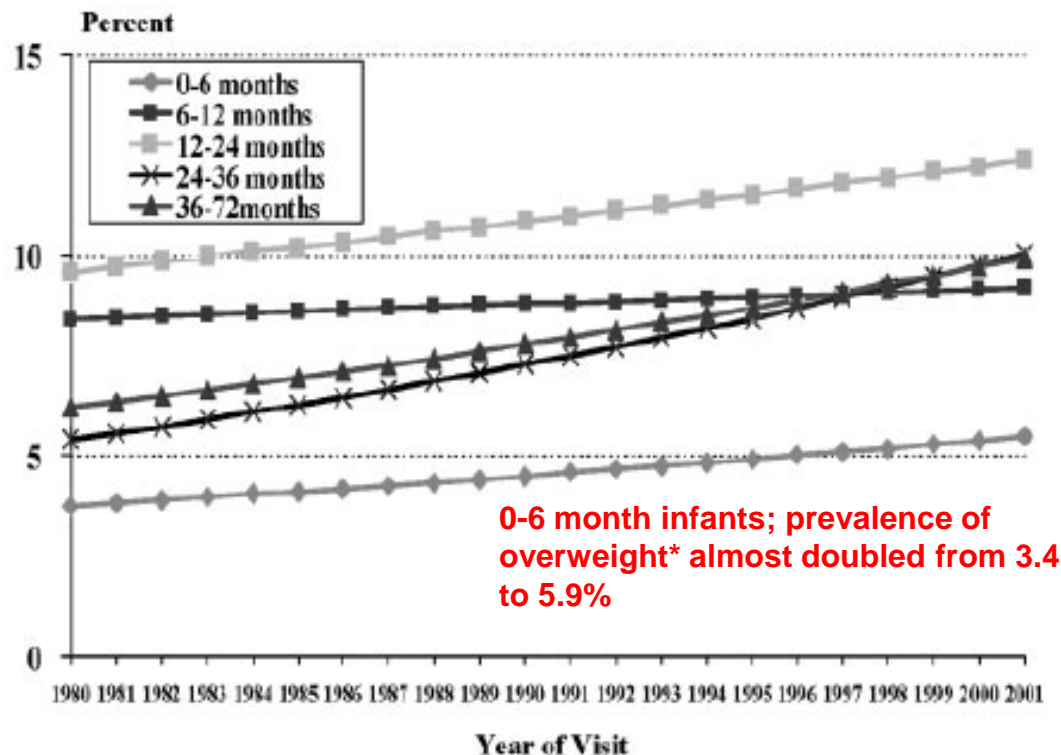
Percentage of children with obesity *click countries for survey details and definitions*



Source: International Obesity Taskforce (<http://www.iaso.org/iotf/obesity/>)



Trends for overweight infants and children



- ~9.5% infants and toddlers with excess weight* in NHANES 2007-2008

Ogden CL (2010) JAMA 303(3): 242-249

Kim, J (2006). Obesity (Silver Spring) 14(7): 1107-1112. (data based on +366,000 well-child care visits at a HMO in Massachusetts)

* Weight-for-length/height \geq 95th percentile



NTP

National Toxicology Program

Non-Traditional Risk Factors for Obesity (Sept. 24, 2009 NIH Obesity Task Force Seminar Series)

- "Infectobesity - Obesity of Infectious Origin"
Nikhil Dhurandhar, Ph.D. (Pennington Biomedical Research Center)
- "Chemicals in the Environment: What Doesn't Make Us Sick Makes Us...Fatter"
Jerry Heindel, Ph.D. (NIEHS)
- "What's Eating You? Stress Pathways to Obesity"
Elissa Epel, Ph.D. (UCSF)
- "The Human Gut Microbiota: Dining In with a Few Trillion Fascinating Friends"
Jeffrey Gordon, M.D. (Wash U)



Reviews/Commentaries/Position Statements

CONSENSUS STATEMENT

Consensus Development Conference on Antipsychotic Drugs and Obesity and Diabetes

AMERICAN DIABETES ASSOCIATION
AMERICAN PSYCHIATRIC ASSOCIATION

AMERICAN ASSOCIATION OF CLINICAL
ENDOCRINOLOGISTS
NORTH AMERICAN ASSOCIATION FOR THE
STUDY OF OBESITY

Concluded that certain second generation antipsychotic drugs are associated with the potential for rapid weight gain, deterioration in lipoprotein profile and increased risk of type 2 diabetes



Overall Goals of Workshop

- Develop research agenda
 - Evaluate strength/weaknesses, consistency, and biological plausibility of findings reported in humans and experimental animals
 - Arsenic/other metals, POPs, BPA, organotins, phthalates, pesticides and nicotine
- Identify the most useful and relevant endpoints in experimental animals, *in vitro* models and screening systems
- Identify data gaps and areas for future evaluation/research.



Research Strategies and Critical Data Needs (Breakouts A-D, Wednesday 3 to 5 pm)

- Propose a research strategy to explore the significance of exposures to environmental chemicals in the rising rates of obesity and diabetes, including human, animal and mechanistic studies
- Are there immediate data gaps that if filled would provide significant direction to longer term research programs?
- Are there research avenues that should be avoided?
- Are there new research tools that need to be developed?



Public Comments

- State name and affiliation
- Pre-registered = 7 minutes
- Not pre-registered = 3 minutes